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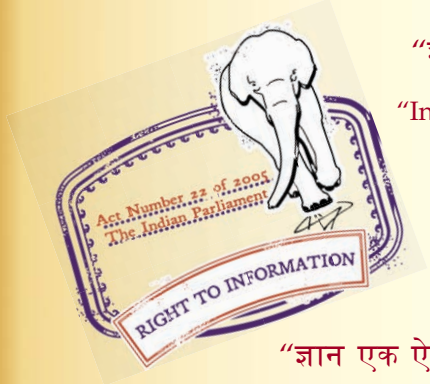

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Indian Standard

CODE OF PRACTICE FOR DESIGN, INSTALLATION AND MAINTENANCE OF SERVICE LINES UP TO AND INCLUDING 650 V

(Fourth Reprint AUGUST 1997)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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(Reaffirmed 1996)

Indian Standard

CODE OF PRACTICE FOR DESIGN, INSTALLATION AND MAINTENANCE OF SERVICE LINES UP TO AND INCLUDING 650 V

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Indian Standard

CODE OF PRACTICE FOR DESIGN, INSTALLATION AND MAINTENANCE OF SERVICE LINES UP TO AND INCLUDING 650 V

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 19 April 1976, after the draft finalized by the Code of Practice for Power Installation and Maintenance Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This code applies to service lines for voltages up to and including 650 V for all types of residential, commercial, industrial and multi-storied buildings in urban and rural areas.

0.3 The Government of India has imposed restrictions on the manufacture of paper insulated lead sheathed cables (PILC) up to 6·6 kV grade. The use and requirements of paper insulated lead sheathed service lines covered in this standard are meant for existing installations only.

0.4 In the preparation of this code, assistance has been derived from the Indian Electricity Act, 1910 and the Indian Electricity Rules, 1956.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This code covers the design, installation and maintenance of service lines for both underground and overhead distribution systems of voltages up to and including 650 V.

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions in addition to those already defined in Indian Standards on cables, shall apply.

2.1 Cable — A length of single insulated conductor (solid or stranded), or two or more such conductors, each provided with its own insulation, which are laid up together. The insulated conductor or conductors may or may not be provided with an overall mechanical protective covering.

2.2 Cable, Armoured — A cable provided with a wrapping of metal (usually in the form of a tape, strip or wire) providing a mechanical protection.

2.3 Cable, Metal-Sheathed — An insulated cable with a metal sheath to serve as mechanical protection and also as a return path for earth fault currents.

2.4 Cable, Polythene-Insulated — A cable in which the insulation of the conductor or conductors is a polythene compound.

2.5 Cable, PVC-Insulated — A cable in which the insulation of the conductors is a polyvinyl chloride compound.

2.6 Cable, PVC-Sheathed — A cable in which mechanical and chemical protection is provided for the core or cores by a sheath of a polyvinyl chloride compound.

2.7 Cable Bond — An electrical connection for the metallic armouring or metallic sheathing of a cable.

2.8 Cable Joint — The connection between two cables.

2.9 Chase — A hollow channel or duct provided in the building structure for accommodation of rising mains and other electrical services.

2.10 Circuit-Breaker — A device capable of making and breaking the circuit under all conditions, and unless specified otherwise so designed as to break the current automatically under abnormal conditions.

2.11 Cleat — An insulated incombustible or fire retardant support normally used for insulated cable.

2.12 Conductor, Aerial — Any conductor which is supported by insulators above the ground and is directly exposed to the weather.

2.13 Conductor, Bare — A conductor not covered with insulating material.

2.14 Conductor, Insulated — A conductor adequately covered with insulating material of such quality and thickness as to prevent danger.

2.15 Connector — A mechanical grip shrouded in insulating material for connecting the conductor of a cable or of a flexible cord to that of another cable or of another flexible cord.

2.16 Cutout — Any appliance for automatically interrupting the transmission of energy through any conductor when the current rises above a predetermined amount and shall also include fusible cutout.

2.17 Cutout Board — A board of insulating material on which the cutouts are installed.

2.18 Distributing Board (Section Fuse Board) — An assembly of small bus-bars with or without disconnection links, switches, fuses, or the like, for connecting, controlling, or protecting a number of branch circuits fed from a main circuit.

2.19 Distributing Mains — The portion of any main with which a service line is, or is intended to be, immediately connected.

2.20 Distribution Pillars — A totally enclosed structure or pillar containing links or fuses for interconnecting distributors.

2.21 Dividing Box — A closed box in which the cores of multicore cable can be connected to external conductors.

2.22 Diversity Factor — The ratio of the sum of the maximum demands of several consumers or loads served by the service line to their maximum simultaneous demands.

2.23 Earth — A connection to the general mass of earth by means of an earth electrode.

2.24 Earth Electrode — A metal plate, pipe or other conductor buried in the general mass of the earth.

2.25 Earthing Conductor — A metallic conductor for connecting electrical equipment to the earth electrode.

2.26 Earth Cable Bond — A cable bond used for connecting the armouring or lead sheath of a cable or both to earth electrode.

2.27 Electric Line — A set of conductors used for transmitting electrical energy.

2.28 Guarded — Covered, shielded, fenced, or otherwise protected by means of suitable casings, barriers, rails or metal screens to remove the possibility of dangerous contact or approach by persons or objects to a point of danger.

2.29 Load Factor — The ratio, expressed as a numerical value or as a percentage, of the energy consumption within a specified period (year, month, day, etc) to the energy consumption that would result from continuous use of the maximum kW demand occurring within the same period.

NOTE — The load factor for a given demand is also equal to the ratio of the utilization time to the time in hours within the same period.

2.30 Meter Cupboard — An enclosure having a locked door and inside which a licensees' energy meters, cutouts and such other apparatus are installed.

2.31 Multi-storied Buildings — A building which is over 24 metres in height including basements, ground and mezzanine floors.

2.32 Neutral Conductor — That conductor of multi-wire system, the voltage of which is normally intermediate between voltage of the other conductors of the system and shall also include return-wire of the single-phase system.

2.33 Overhead Line — Any electric supply line which is placed above ground and in open air but excluding live rails of a traction system.

2.34 Rated Voltage (of Cable) — The voltage at which the cable is designed to operate. In case of three-phase ac system, the rated voltage means the voltage between phases.

2.35 Sealing Ends (Sealing Box or Sealing Chamber) — A close box fitted to one end of a cable for external connection, in such a manner as to protect the insulation of the cable from air or moisture.

2.36 Service Line — Any electric supply line through which energy is, or is intended to be, supplied by a licensee:

a) to a single consumer either from a distributing main or immediately from the licensee's premises, or

b) from a distributing main to a group of consumers on the same premises or on adjoining premises supplied from the same point of the distributing mains.

2.37 Service Position — The place where the service line terminates (*see also* **7.3**).

2.38 Straight Through Joint — A joint used for connecting two ends of conductors or cables in series.

2.39 Tee Joint — A joint used for connecting a branch conductor or cable to a main conductor or cable, where the latter continues beyond the branch.

2.40 Trough — A preformed channel in which cables are laid to protect them against external mechanical damage.

2.41 Underground Line — An electric line laid in the ground.

2.42 Way Leave — Permission obtained from local authorities, government departments, port trusts, railway authorities or owners to facilitate laying and placing of electric supply mains or both through their property.

2.43 Mains — Any electric supply line through which energy is, or is intended to be, supplied by a licensee to the consumers.

3. GENERAL REQUIREMENTS

3.1 Conformity with Indian Electricity Act, 1910 — The work of installation of the service line shall be carried out in conformity with the requirements of the Indian Electricity Act, 1910 and the Indian Electricity Rules, 1956, framed thereunder.

3.2 The following rules of Indian Electricity Rules, 1956 are particularly relevant:

Rules 29 to 33, 35, 39, 40, 42, 50, 51, 57, 58 and 79

4. EXCHANGE OF INFORMATION

4.1 Exchange of information is necessary between the licensee and the requisitionist for electric supply, owners of the properties and local authorities through or over which the service line is intended to pass. The engineer of the licensee and architect or builder, in early consultation, should decide upon the route of the service cable, location of service position and details of ducts or other accommodation required for running the cable from the entry position at the boundary of the premises to the location of service position.

4.1.1 *Requisitionist* — The requisitionist for electric supply shall fill in the requisition form as required under Clause (V) or (VI) of the Schedule to the Indian Electricity Act, 1910, and submit the same to the licensee duly completed.

4.1.2 The requisitionist shall submit to the licensee, whenever called for, complete set of drawing of buildings and site plans to enable licensees to decide upon the route and position of service mains.

5. MATERIALS

5.1 All materials used in the installation of service line shall be sufficient in power and size and of sufficient mechanical strength for the work they may be required to do. Furthermore, materials shall conform to the relevant Indian Standards wherever these exist.

6. FIXING OF SERVICE POSITION

6.1 Service lines shall be terminated into adequately ventilated and lighted positions enclosed with masonry, good quality wood or metal enclosure not easily accessible to unauthorized persons but accessible at all reasonable times to the licensee's representatives.

6.2 The service lines shall not be terminated near furnaces and hearths, or such other places where gases, fire hazards and other fumes exist. As far as possible the service position should not be located near or below washing places, lavatory blocks, near drainage, water and gas pipes, etc.

6.3 The service lines should not be terminated in positions where heavy materials are stacked, shifted or moved. Ample space shall be available in front for the workman to work safely on the line. Wherever medium pressure exists this space shall not be less than one metre.

7. SIZE OF THE CABIN, BOX OR ENCLOSURE

7.1 The enclosure shall afford adequate protection to the licensee's apparatus from vermin and weather.

7.2 The size of the service cabin, box or enclosure should be sufficient to accommodate the licensee's equipment and the meters for all the consumers, including the prospective consumers, if any.

7.3 Sufficient space for installing the main switches and termination of consumer's wiring should be available adjacent to the service position.

8. ROUTE OF CABLE

8.1 While deciding the route of the service cable, the following aspects should be considered.

8.1.1 The route should be, as far as possible, the shortest distance from the nearest licensee's distributing mains to the proposed service position.

8.1.2 Underground obstructions, such as services of other utilities, drainage, pipes and manholes, should be avoided.

8.1.3 The route of the cable should be such that a clear space is available for laying the service cable, as well as carrying out repairs and maintenance thereto.

8.1.4 Where the route of the cable is to be reinstated by paved surface, the feasibility of laying ducts or pipes and provision of manholes is to be considered, for laying the service cable to avoid future excavation of the paved surface for maintenance.

8.1.5 The route of the service lines shall provide ample space for bending cables within safe limits wherever necessary.

8.1.6 If the route of the cable is to pass through the basement, the feasibility of inserting lead-in tubes through the walls and cleating of cables to the walls or ceilings is to be considered.

8.1.7 Where the route of the cable is such, that the cable is required to be cleated to the walls or ceiling, it should be clear of locations where heavy materials are likely to be stored or moved.

8.1.8 The route of the cable shall be away from furnaces and hearths and such other locations where gases and fumes exist. It should also be clear from drainage, water or gas pipes, etc.

9. SELECTION OF SIZE OF CABLE

9.1 The choice of the size of the cable shall ensure that voltage variation to the consumer remains within the permissible limits stipulated in the Indian Electricity Rules, 1956. This would depend on the diversity of load, current carrying capacity, future extensions contemplated, type of installations and site conditions. The current carrying capacity of the cable is influenced by the type of material and construction used for the conductor and insulations and their short-circuit levels [*see also* IS : 3961 (Parts I to V)*].

9.2 The sizes of the cables for service lines shall be chosen in accordance with IS : 692-1973†, IS : 694 (Part II)-1964‡, IS : 1554 (Part I)-1964§, IS : 1554 (Part II)-1970¶ and IS : 3035 (Parts I to III)‖. For deciding current carrying capacity, reference shall be made to IS : 3961 (Parts I to V)*.

10. METHOD OF EXCAVATION AND LAYING OF SERVICE CABLE

10.1 The method of excavation and laying of service cable shall be in accordance with IS : 1255-1967**.

11. LEAD-IN TUBE

11.1 Where the service cable is to be laid, the entry to the building through the wall shall be through a lead-in tube fixed in the wall.

11.2 The size of the lead-in tube shall be so chosen as to permit easy drawal of cables selected for the service lines and generally consist of GI or RCC pipe of 75 to 100 mm diameter embedded and firmly grouted in the wall.

*Recommended current ratings for cables:
Part I-1967 Paper-insulated lead-sheathed cables.
Part II-1967 PVC-insulated and PVC-sheathed heavy duty cables.
Part III-1968 Rubber insulated cables.
Part IV-1968 Polyethylene insulated cables.
Part V-1968 PVC-insulated light duty cables.

†Specification for paper insulated lead-sheathed cables for electricity supply (*second revision*).

‡Specification for PVC insulated cables (for voltages up to 1 100 V): Part II With aluminium conductors (*revised*).

§Specification for PVC insulated (heavy duty) electric cables: Part I For working voltages up to and including 1 100 volts (*revised*).

¶Specification for PVC insulated (heavy duty) electric cables: Part II For working voltages from 3·3 kV up to and including 11 kV.

‖Specification for thermoplastic insulated weatherproof cables:
Part I-1965 PVC insulated and PVC sheathed.
Part II-1965 Polyethylene insulated, taped or untaped, braided and compounded.
Part III-1967 Polyethylene insulated and polyethylene sheathed.

**Code of practice for installation and maintenance of paper insulated power cables (up to and including 33 kV) (*first revision*).

11.3 The point of entry of the cable through the lead-in tube should be properly sealed to prevent the ingress of water and entry of vermin, etc.

12. SUPPORTING THE CABLE

12.1 Suitable supports (clips, clamps, etc) should be provided at regular intervals which should not be less than one metre or more than two metres, depending upon the size and weight of the cable. The supports should be fixed either to the walls or to the ceiling, as required.

13. SERVICE CABLES TO MULTI-STORIED BUILDINGS

13.1 Liaison between the architect, owner, builder, electrical contractor and the licensees is essential for deciding upon the number, size and location of the electric supply services and to decide whether all services are to be terminated on the ground floor or on upper floors. There should be consultations between these persons during the planning stage of the work in order to decide upon the following:

a) Point of entry of licensee's service cables;
b) Route of rising and lateral conductors;
c) Provisions to be made during the course of the building works for the adequate accommodation of ducts, fuse gears and metering arrangements on the premises.

13.2 In multi-storied buildings readily accessible vertical ducts or chases of adequate capacity should be provided in the building structure for the accommodation of the rising service cables/rising mains.

13.3 In general, vertical ducts or chases should not be less than 450 mm wide and 150 mm deep in construction, but in large buildings where a number of rising service cables/mains are to be installed the vertical duct or chase may be as much wide as necessary. Fire barriers should be provided to comply with the fire fighting requirements.

13.4 The design of the vertical duct or chase should permit easy installation and replacement of the cables/mains.

13.5 At the upper end of the vertical duct may be provided, if required, with a hook of adequate size for pulley arrangement for pulling the service cable up to the topmost floor so as to provide for easy installation and quick replacement of faulty cable.

13.6 Only non-draining type of cables should be used for service to the upper floors.

13.7 Adequate precautions should be taken to prevent the entry of water or dust into the duct.

14. CONNECTION OF SERVICE CABLE TO THE DISTRIBUTING MAINS

14.1 The service cable(s) may be connected to the distributing mains, either overhead or underground by any of the following methods:

a) By teeing it to the underground distributing cable,
b) By tapping from the overhead distribution line,
c) By connecting it to a low voltage distribution board of a substation situated either on the premises or outside,
d) By connecting it to a distribution pillar, and
e) By looping it through termination point of another service.

15. METHOD OF TERMINATION

15.1 Paper insulated lead sheathed (PILC) cables shall be terminated in a suitable terminal box in accordance with details given in IS : 1255-1967*.

15.2 In case of PVC cables, a gland made of brass, mild steel or aluminium of suitable size may be used for the termination of the service cables. Typical arrangements are shown in Fig. 1 and 2.

16. CONNECTION OF SERVICE LINE TO THE CUTOUT AT THE TERMINATION POINT AT CONSUMER'S END

16.1 The cores of the service cable shall be connected to suitable size of cutouts installed inside the enclosure (*see* Fig. 3).

16.2 The other end of the cutout should be connected to the meter in case of one meter (*see* Fig. 3) or to the other meter cutouts in case of more than one meter through suitable means such as bus-bars (*see* Fig. 4). Such bus-bars, when provided, shall be adequately and properly covered and the live metal parts suitably made inaccessible.

16.3 Precautions and techniques to be employed in using the cables with aluminium conductors shall be in accordance with Appendix C of IS : 732-1963†.

17. OVERHEAD LINES

17.1 No service connection shall be taken off an overhead line except at a point of support.

17.2 The service line shall be installed and guarding provided in accordance with the provisions of IS : 5613 (Part I/Sec 1)-1970‡ and IS : 5613 (Part I/Sec 2)-1971§.

*Code of practice for installation and maintenance of paper insulated power cables (up to and including 33 kV) (*first revision*).

†Code of practice for electrical wiring installations (system voltage not exceeding 650 volts) *revised*).

‡Code of practice for design, installation and maintenance of overhead power lines: Part I Lines up to and including 11 kV, Section 1 Design.

§Code of practice for design, installation and maintenance of overhead power lines: Part I Lines up to and including 11 kV, Section 2 Installation and maintenance.

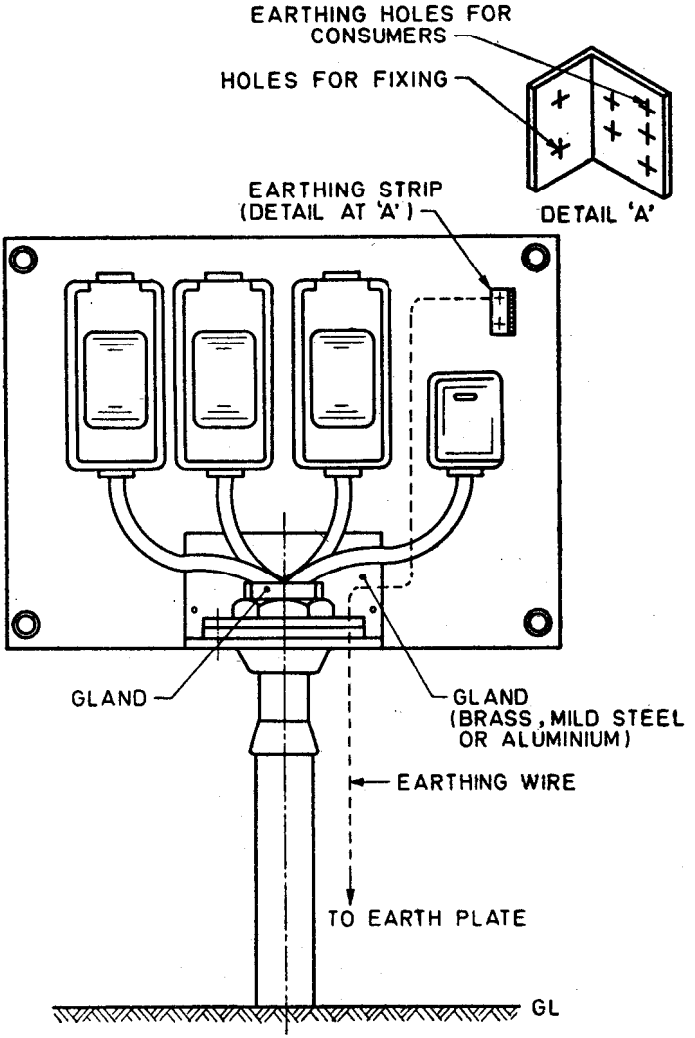
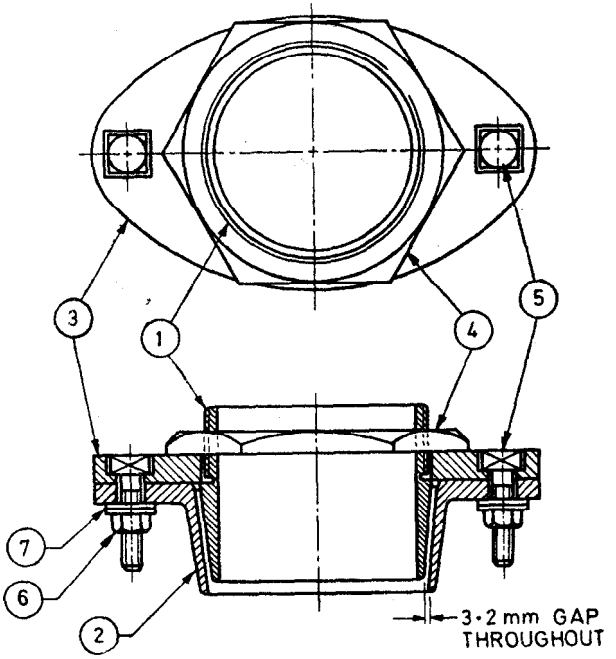


FIG. 1 TYPICAL ARRANGEMENT FOR TERMINATION FOR 4 CORE PVC SERVICE CABLE



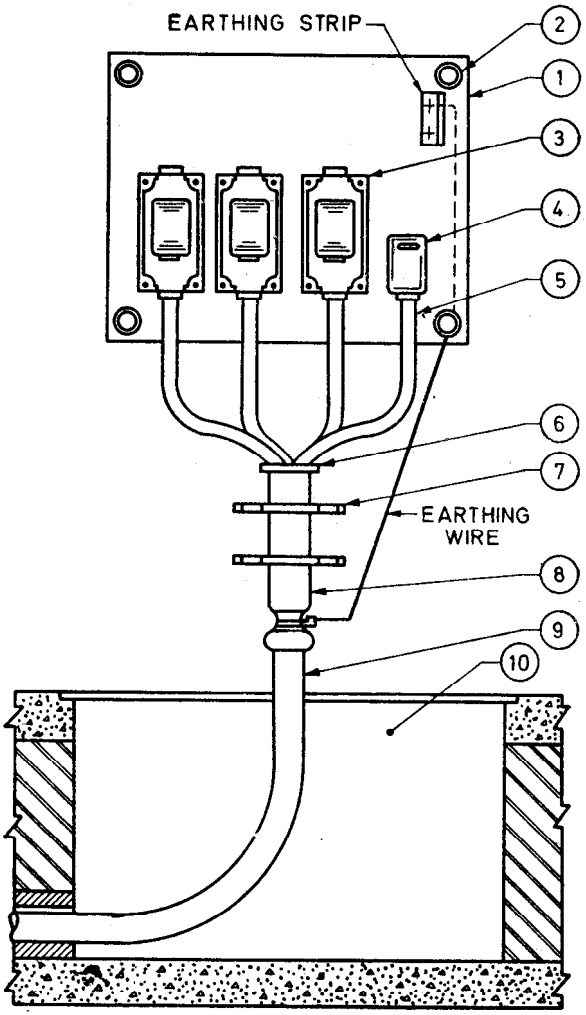
Part No.	*Description*	*Number*
1	Inner cup	1
2	Outer cup	1
3	Flange	1
4	Check nut	1
5	Square head screw	2
6	Hexagonal nut	2
7	Plain washers	4

FIG. 2 TYPICAL SKETCH SHOWING CABLE TERMINATING GLAND

17.3 In case of overhead distribution, the following method shall be adopted for installing overhead services:

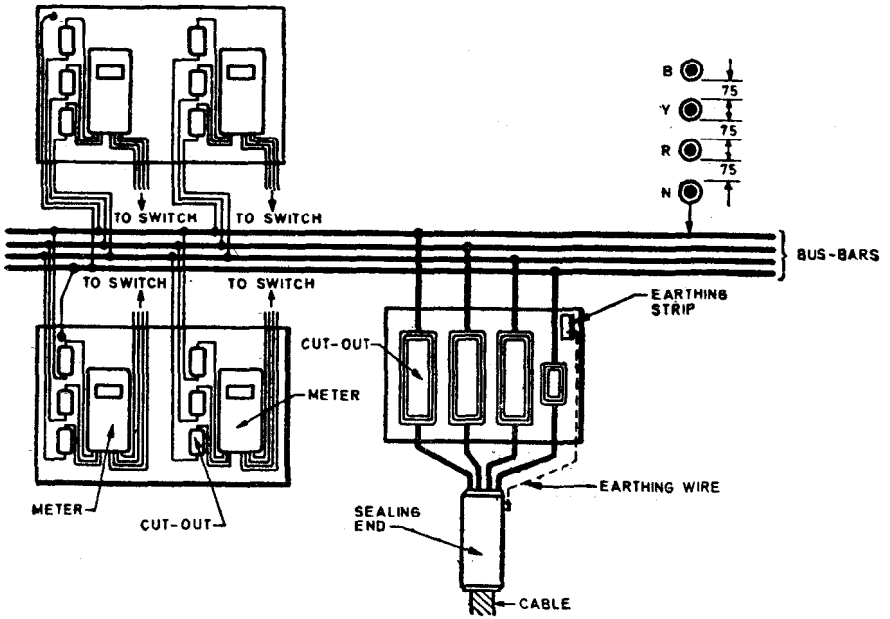
a) Bare conductor,
b) Insulated conductors, and
c) Unarmoured cable.

17.3.1 *Bare Conductor*



Part No.	*Description*	*Part No.*	*Description*
1	Cutout board	6	Teak-wood bush, impregnated
2	Board insulator	7	Clamp for sealing end
3	Cutout	8	Sealing end
4	Neutral connector	9	Cable
5	Leads	10	Manhole

FIG. 3 TYPICAL CONNECTION OF SERVICE CABLE AT THE TERMINATION POINT



All dimensions in millimetres.

FIG. 4 TYPICAL ARRANGEMENT OF BUS-BAR OVER SERVICE POSITION

17.3.1.1 *Vertical entry* — The bare conductors shall be fixed to the cross arm mounted on galvanized iron pipe of minimum diameter of 50 mm. The bare conductors shall be kept at a height of 4·5 m from the top of the structure except where they are adequately guarded in which case the vertical clearance may be 2·7 m. The GI pipe shall be provided with double bends at the top. The pipe shall be secured by at least 2 clamps made of 50 × 6 mm mild steel flats and fixed firmly to the wall. It shall, in addition, be provided with a guy. Service connection shall be given with weather-proof or PVC-insulated cable through this GI pipe. Well fitting wooden or PVC bushes shall be provided at both ends of this GI pipe.

17.3.1.2 *Horizontal entry* — The bare conductors shall be fixed to a bracket in the form of channel (⌐¬) made of angle iron of size not less than 50 × 50 × 6 mm with insulator. The bare conductors shall be kept 1·8 m away from the edge of the structure. The ends of the bracket shall be cut and split and embedded in the wall with cement mortar. The service connection shall be given with weather-proof or PVC-insulated cable through suitable size GI pipe fixed to the wall. The GI pipe shall be bell mouthed

and bent downwards near the service entry. Well fitting wooden or PVC bushes shall be provided at both ends of the GI pipe.

17.3.2 *Insulated Conductors* — Service connection shall be given by weather-proof or PVC-insulated cable on GI bearer wire. The GI bearer wire shall be of minimum 3·15 mm size. One end of the GI bearer wire shall be attached to a clamp which is fastened to the nearest pole carrying distribution lines from where the service connection is intended to be given. The other end of the GI bearer wire shall be fastened to 20 mm dia GI pipe for a clearance up to 4·5 m which is fixed to the wall with guy, etc. The GI pipe shall be fixed to an angle iron of size 40 × 40 × 6 mm with suitable guy for high supports and for a clearance exceeding 4·5 m. Alternatively, when the height of the structure permits minimum ground clearance, the other end of this GI bearer wire may be fixed to a hook, I-bolt or bracket embedded with cement mortar in the wall. The weather-proof or PVC-insulated cable shall pass through GI pipe of minimum diameter of 20 mm, which is bell mouthed and bent downwards. Well fitting wooden or PVC bushes shall be provided at both ends of the GI pipe. Fig. 5 illustrates one typical example of overhead insulated wire service line.

17.3.3 *Unarmoured Cable* — PVC-insulated and PVC-sheathed unarmoured underground cable may be used in place of weather-proof or PVC-insulated cable for giving service connection on GI bearer wire.

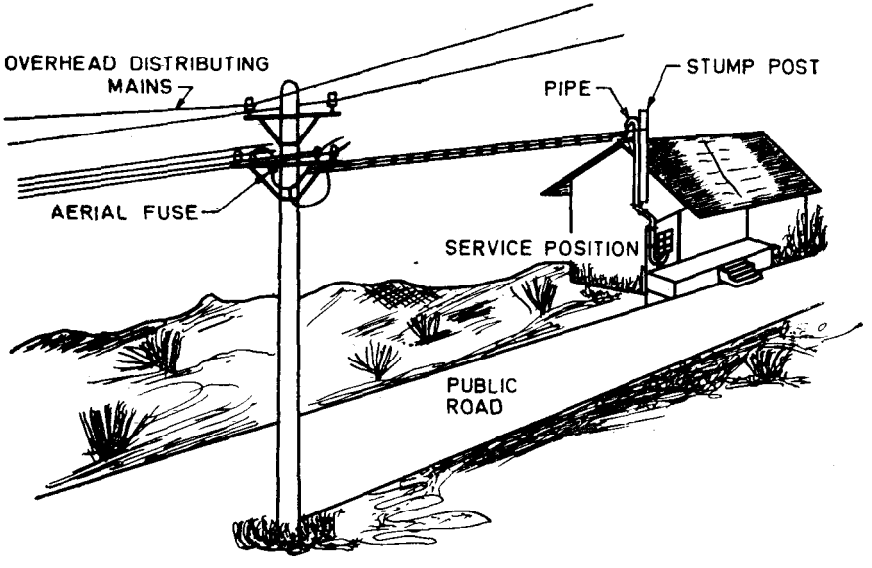


FIG. 5 TYPICAL OVERHEAD INSULATED WIRE SERVICE LINE

17.4 The service line should be installed and guarding provided in accordance with the provisions of IS : 5613 (Part I/Sec 1)-1970* and IS : 5613 (Part I/Sec 2)-1971†.

17.5 The run of the service line shall be such as to be normally out of reach of persons in the premises even when leaning out of windows. The heights and clearances of the service line shall be in accordance with the provisions of the Rule 79 of the Indian Electricity Rules, 1956.

18. JOINTING OF OVERHEAD SERVICES TO THE DISTRIBUTION LINES

18.1 In case of copper to aluminium joints, it is recommended that a bimetallic clamp should be used and in case of aluminium to aluminium joints, anti-corrosive grease should be applied to the conductors before mechanically fixing the clamp.

18.2 Tee off of the service line should be done only on a pole and not between any span.

18.3 The phase conductors of the service line should be connected to the distributing mains through (a) an aerial fuse or (b) preferably fuses installed on the poles. The service line is tapped from these fuses.

18.4 While taking overhead service line through insulated conductor to a consumer, spare lengths of cable should be left as loops at both the ends, that is, at the connection with the mains as well as at the consumer end.

19. EARTHING

19.1 For details of earthing, reference shall be made to IS : 3043-1966‡.

19.2 A suitable earth terminal shall be provided at the service position in accordance with Rule 33 of the Indian Electricity Rules, 1956.

19.3 The earth terminal should be connected by means of a conductor of a suitable size to the metal sheathing of the service cable in case of PILC cables. In case of PVC-unarmoured cable, an earth continuity conductor should be provided for this purpose in accordance with IS : 3043-1966‡. In the case of PVC-armoured cables, the armouring of the cable may be used if it is of adequate capacity (*see* IS : 3043-1966‡) for this purpose.

19.4 Overhead Services — In case of insulated conductor service line, the GI bearer wire (messenger wire) is bound to the earth wire of the overhead distributing system. At the consumer's end a separate earth wire may be connected to the GI bearer wire (messenger wire) and terminated at the earth terminal at the service position.

*Code of practice for design, installation and maintenance of overhead power lines: Part I Lines up to and including 11 kV, Section 1 Design.

†Code of practice for design, installation and maintenance of overhead power lines: Part I Lines up to and including 11 kV, Section 2 Installation and maintenance.

‡Code of practice for earthing.

19.5 In case of bare conductor service line, a separate earth wire is run along with the phase and neutral conductors, and is connected to the earth wire of overhead distributing system. At the consumers end a separate earth wire is connected and terminated at the earth terminal at the service position.

19.6 The metallic casing of the service cutouts shall be earthed to the earthing system.

20. MAINTENANCE OF SERVICE LINES

20.1 Underground Services — Normally, very little maintenance is required for underground services. The maintenance of the service lines includes inspection, maintenance and care of all cable termination boxes or devices, earthing devices, cutouts, cutout boards and its connections, etc.

20.1.1 Whenever the service cable or joints are accessible as in manholes, ducts, etc, periodical inspection should be made so that timely repairs can be carried out before the cables or joints actually cause interruption of supply to the service.

20.1.2 The frequency and details of schedules of inspection should be determined by each electric supply undertaking from its own experience. Important and/or heavily loaded service cables will require more attention.

20.1.3 Repairs to service cables involve replacement of a section of the defective cable or replacement of the entire cable as the case may be. In most cases where the insulation has not been damaged severely, or where moisture has not obtained ingress into the insulation, it may only be necessary to install a joint at the point of cable failure.

20.2 Overhead Service Lines — The overhead lines should be inspected periodically for maintenance purposes to detect any faults which may lead to breakdown of electric supply and necessary repairs should be done immediately. The main points to be noted while inspecting, are given below and repair action should be taken immediately:

a) Tilted poles, deformed cross-arms and earthwire supports; settled or bulging soil around pole foundations; yielding of foundation, cracks or breaks in the poles above the ground level; missing nuts; rust and cracks; missing nuts on anchor bolts and rotting of wood cross-arms or stump post where used.

b) Kite strings and other extraneous matters, excessive or loose sag, improper clearance and conductor corrosion.

c) Deterioration of insulation of service lines.

d) Broken porcelain, burnt and fused spots on the glaze, burning of insulator and fittings; dirty insulator, spindles slipping out of insulator caps, bent pins, and rusty fittings.

e) Damaged or broken earthwire at the ground level, missing conductor, fixing stapples on supports and missing clamps at the tops.

f) Loose stays and inadequate stays.

g) The trees which have become dangerous for the lines and require felling or trimming.

h) Bird nests, loose jumpers, jumpers jumbling on the poles and overhead jumpers.

j) Many breakdowns including slipping of conductor due to loose clamps, cracks in the porcelain of insulator and defects on the suspension fittings can only be discovered or seen by going on top of every pole. This inspection should be carried out at frequencies depending on local conditions.

k) The metal poles should be checked at random after every 6 years to detect any rust at the joints. The underground parts are also liable to corrosion and therefore, should be inspected for effecting any repairs or replacement.

m) The conductor clearance should be checked periodically as they are likely to be changed due to a variety of service conditions.

n) The continuity of the earth and operation of safety devices as provided should be checked periodically.

p) Renewal of the anticorrosive grease for aluminium to aluminium joints.

21. SERVICE RECORDS

21.1 It is recommended to prepare and keep up-to-date permanent records of all service lines. Such records are necessary for extensions or diversions of the existing services and for locating of faults on service cable.

21.2 The following data should be given in the service records:

a) Service number;

b) Name of the requisitionist;

c) Address where the service line is installed;

d) Size and type of service line;

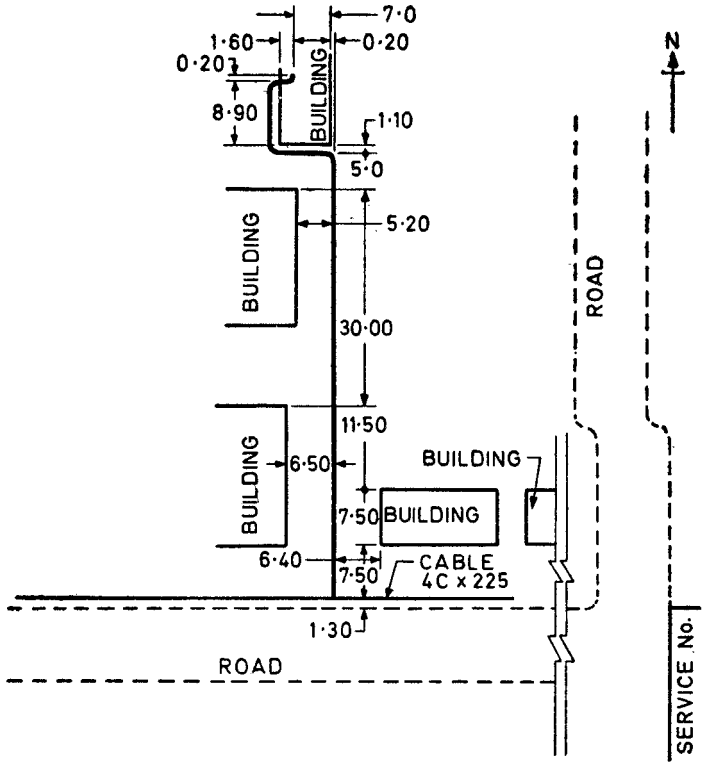
e) Location of the run and termination of the service line in relation to the street, kerb line and properties, etc;

f) Positions of all joints;

g) Accurate lengths of the service cable from joint to joint or from the distributing mains to service termination point; and

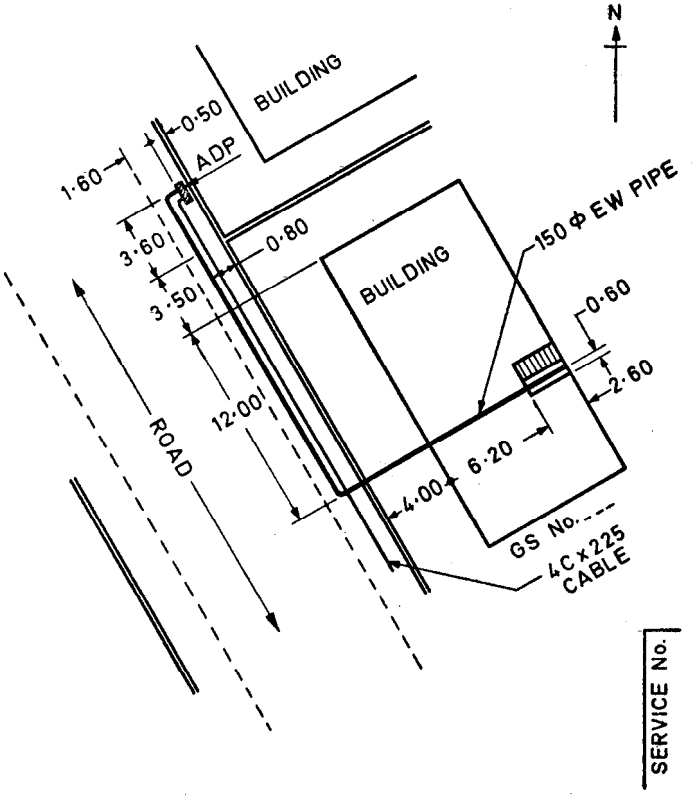
h) Date of laying and jointing the service line.

21.3 Typical examples of these records in the form of sketches are given in Fig. 6, 7 and 8.



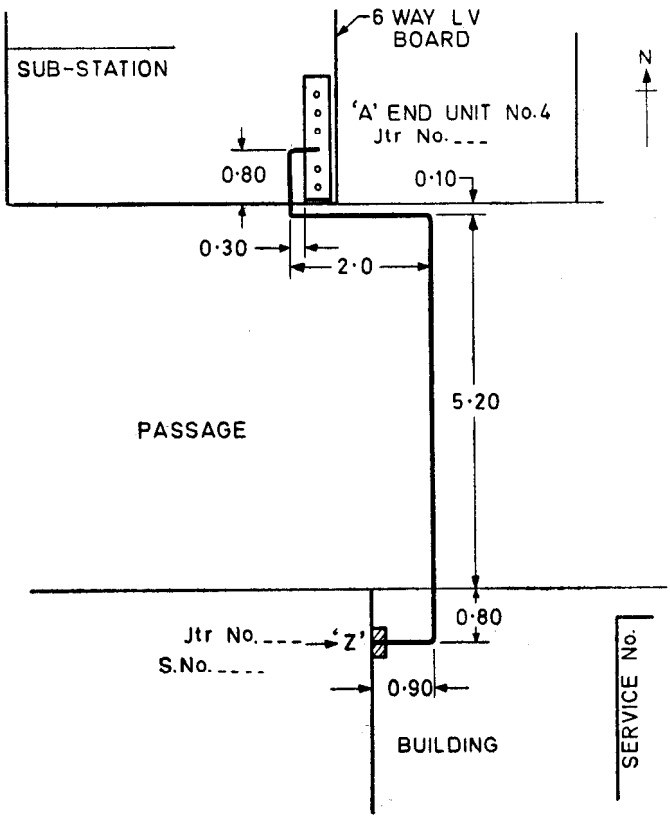
All dimensions in millimetres.

FIG. 6 TYPICAL DIAGRAM SHOWING SERVICE LINE TEED TO A DISTRIBUTOR



All dimensions in millimetres.

FIG. 7 TYPICAL DIAGRAM SHOWING SERVICE LINE CONNECTED TO A DISTRIBUTION PILLAR



All dimensions in millimetres.

FIG. 8 TYPICAL DIAGRAM SHOWING SERVICE LINE CONNECTED TO A LOW VOLTAGE DISTRIBUTION BOARD OF A SUB-STATION

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